NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

CANES IMPLEMENTATION: ANALYSIS OF BUDGETARY, BUSINESS, AND POLICY CHALLENGES

December 2014

By: **Reginald Badua and**
Shalanda Warr

Advisors: **Albert Barreto**
Douglas Brinkley

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704–0188*
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.			
1. AGENCY USE ONLY ***(Leave blank)***	**2. REPORT DATE** December 2014	**3. REPORT TYPE AND DATES COVERED** MBA Professional Report	
4. TITLE AND SUBTITLE CANES IMPLEMENTATION: ANALYSIS OF BUDGETARY, BUSINESS, AND POLICY CHALLENGES			**5. FUNDING NUMBERS**
6. AUTHOR(S) Reginald Badua and Shalanda Warr			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number ____N/A____.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution is Unlimited			**12b. DISTRIBUTION CODE**

13. ABSTRACT (maximum 200 words)

To reduce cost and effectively manage afloat networks, the Navy is adopting current industry best practices, including the use of a common computing environment and open architecture. The Consolidated Afloat Network Enterprise System (CANES) was designed to employ these frameworks. CANES will combine five existing shipboard networks by utilizing commercial-off-the-shelf hardware and software. The use of CANES is expected to reduce overall cost by eliminating redundant information technology infrastructure and migrating to service-oriented architecture.

This report focuses on acquisition strategy and policy, technological influences, and economic factors that could affect the ongoing implementation process of the CANES program. These factors directly impact the decisions being made in fielding the application of CANES. An analysis of these approaches in the context of these factors shows a negative effect of deficit-driven budgeting on schedule and performance.

14. SUBJECT TERMS consolidate afloat networks and enterprise services, CANES, shipboard network, C4I, ISNS, network consolidation, acquisition program management			**15. NUMBER OF PAGES** 61
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UU

NSN 7540–01-280-5500

Standard Form 298 (Rev. 2–89)
Prescribed by ANSI Std. 239–18

THIS PAGE INTENTIONALLY LEFT BLANK

CANES IMPLEMENTATION: ANALYSIS OF BUDGETARY, BUSINESS, AND POLICY CHALLENGES

Reginald Badua, Lieutenant, United States Navy
Shalanda Warr, Lieutenant, United States Navy

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

NAVAL POSTGRADUATE SCHOOL
December 2014

Authors: Reginald Badua

Shalanda Warr

Approved by: Albert Barreto

Douglas Brinkley

William R. Gates, Dean
Graduate School of Business and Public Policy

THIS PAGE INTENTIONALLY LEFT BLANK

CANES IMPLEMENTATION: ANALYSIS OF BUDGETARY, BUSINESS, AND POLICY CHALLENGES

ABSTRACT

To reduce cost and effectively manage afloat networks, the Navy is adopting current industry best practices, including the use of a common computing environment and open architecture. The Consolidated Afloat Network Enterprise System (CANES) was designed to employ these frameworks. CANES will combine five existing shipboard networks by utilizing commercial-off-the-shelf hardware and software. The use of CANES is expected to reduce overall cost by eliminating redundant information technology infrastructure and migrating to service-oriented architecture.

This report focuses on acquisition strategy and policy, technological influences, and economic factors that could affect the ongoing implementation process of the CANES program. These factors directly impact the decisions being made in fielding the application of CANES. An analysis of these approaches in the context of these factors shows a negative effect of deficit-driven budgeting on schedule and performance.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

ACQ	Acquisitions
ARCI	Acoustic Rapid COTS Insertion
BCA	Budget Control Act
BPR	Business Process Review
C4I	Command, Control, Communications, Computers, and Intelligence
CANES	Consolidated Afloat Network Enterprise System
CBO	Congressional Budgeting Officer
CCA	Clinger-Cohen Act
CCE	Common Computing Environment
CIO	Chief Information Officer
CONOPS	Concept of Operations
COTS	Commercial Off the Shelf
DAG	Defense Acquisitions Guidebook
DAS	Defense Acquisitions System
DOD	Department of Defense
DODI	Department of Defense Instruction
FM&C	Financial Management and Comptroller
FY	Fiscal Year
IT	Information Technology
IS	Information Systems
JCIDS	Joint Capabilities Integration and Development System
MBA	Masters of Business Administration
NCW	Net-Centric Warfare
NII	Network Information and Integration
NSS	National Security Strategy
OA	Open Architecture
OCO	Overseas Contingency Operations
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
O&M	Operations and Maintenance

OMB	Office of Management and Budget
PDD	Process Description Document
PEO	Program Executive Office
PPBE	Planning, Programming, Budgeting and Execution
PPBS	Planning, Programming and Budgeting System
PM	Program Management
QOS	Quality of Service
RDT&E	Research Development Test and Evaluation
SHIPMAIN	Ship Maintenance
VADM	Vice Admiral

ACKNOWLEDGMENTS

We would like to thank our advisors, Professors Alberto Barreto and. Douglas Brinkley, for their willingness to assist us and their efforts to improve our writing, not only for this MBA Professional Report but also for the future.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

The Navy is facing a dramatic culture shift with the adoption of the Consolidated Afloat Network Enterprise System (CANES). The use of commercial-off-the-shelf (COTS) hardware and software and civilian-type open architecture (OA) presents a series of challenges. The purpose of this report is to provide the Navy with a multifaceted body of knowledge on how the information systems (IS) acquisitions process works. The current approaches, program management, requirements, and budgeting will be analyzed in the context of CANES.

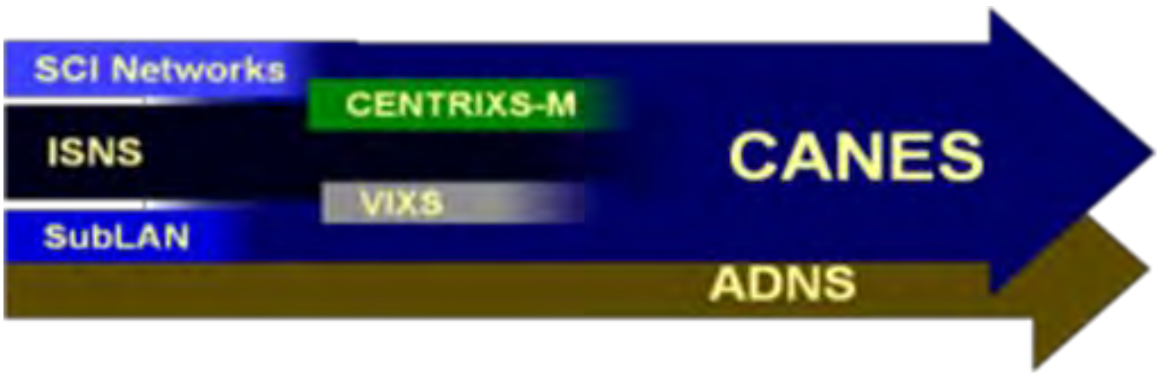

Figure 1. Evolution of CANES (from Program Executive Office, Command, Control, Communications, Computers and Intelligence [PEO C4I], 2014)

The CANES effort arose from the lack of integration of the large number of networks aboard ships. Each network required specialized training and unique support aspects. As a result, maintenance was difficult and costly. Figure 1 shows the five legacy networks that have been merged into one architecture. A principal goal of CANES was to have flexible shipboard networks that could be easily adapted by platforms with reduced maintenance and costs. To achieve this goal, civilian commercial entities began transitioning from hardware- and software-oriented architecture to a more service-oriented architecture by using virtualization and other applications. The CANES program is the transference and repurposing of common computing architecture for use in nontactical afloat systems (Riposo, Gordon, Murphy, Wilson & Porche, 2012). Figure 2 shows what the hardware setup will have a less complex design, aboard an Arleigh Burke Class Destroyer when CANES is implemented.

Figure 2. Depiction of an Arleigh Burke class destroyer network (from PEO C4I, 2014)

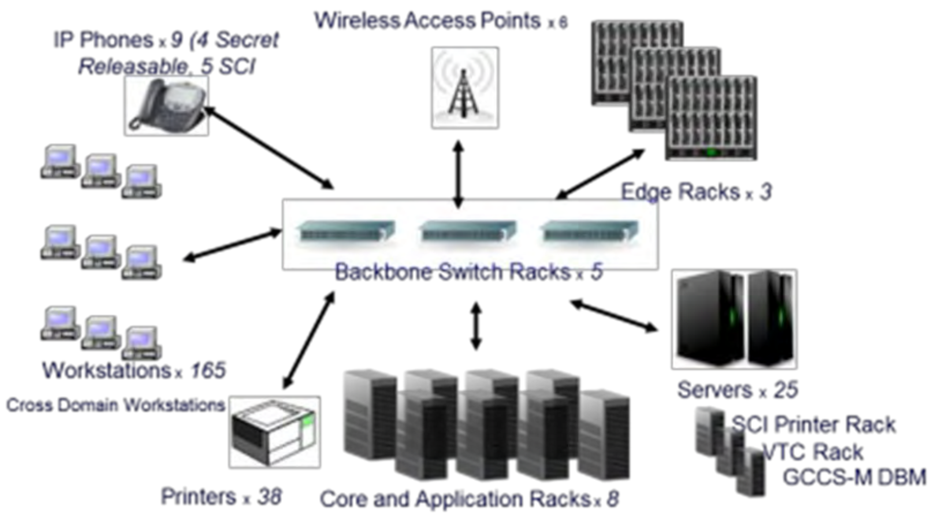

Figure 3. Architecture (from PEO C4I, 2014)

The Navy's approach for application integration (and eventually the way-forward strategy for cloud architecture) is called the common computing environment (CCE). The Tactical Networks Directorate, PEO C41, aims to use the CCE to consolidate legacy network configurations into one a unified hardware and software environment. Figure 3 shows the notional hardware configuration for CANES aboard an Arleigh Burke-class Destroyer. Additionally, the CCE will become the standard by which applications and systems are developed for future use and integration.

The CCE standard would have a profound effect on the methods used to analyze, integrate, test, and certify applications or systems. Proposed changes will be scrutinized by their potential to affect existing system resources. A virtualized CCE would be utilized to test any new server-hosted application. Configuration shortfalls that result in interface requirement changes would be exposed and summarily corrected before fielding (CANES PDD).

THIS PAGE INTENTIONALLY LEFT BLANK

II. BACKGROUND

Currently, the CANES technical strategy makes heavy use of COTS software and hardware. The goal within CANES is to refresh software design every two years and hardware every four years in an attempt to maintain pace with developments in the civilian industry. Rapid technological growth coupled with the highly competitive nature of the civilian technology industry could render the CANES business strategy unattainable.

A. TECHNOLOGICAL GROWTH THEORY

In a paper published in 1965, Gordon E. Moore documented the number of transistors in an integrated circuit. He drew data from the known history of computer hardware and noticed that the number of transistors seemed to double every two years (Moore, 1965). While Moore’s paper focused solely on densely integrated circuits, the application of Moore’s research has been expanded by academics and industry practitioners alike. Moore’s Law is not a traditional scientific law but an observation that has been a widely used framework. Over the years, Moore’s Law has become an estimating and planning tool in the semiconductor industry. To stay competitive in the market, research and development efforts have subsequently been tailored to meet two-year objectives. The law has also been expanded to describe other trends within the computer industry, such as memory capacity, pixel size and resolution, and microprocessor costs.

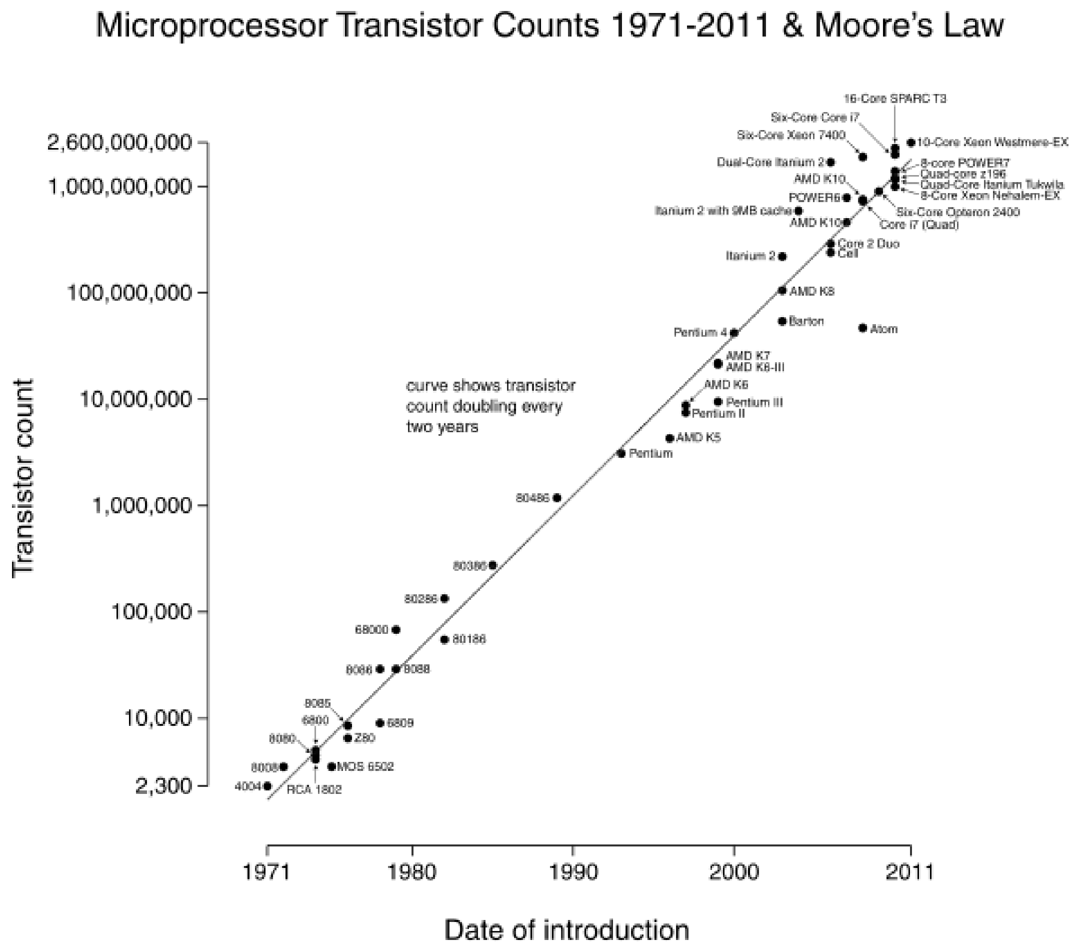

Figure 4. Moore's Law (from Schaller, 2002)

Figure 4 shows the linear growth of the number of transistor components through four decades. Since many technologies are related to circuit densities, the acceleration or deceleration of the growth rate could have widespread implications. Technology professionals believe the trend will slow; claiming that the transistor counts will double over the years starting this decade, or that the trend will stop completely (McMillan, 2014; Tuomi, 2002).

B. QUALITY-ADJUSTED PRICE OF INFORMATION TECHNOLOGY EQUIPMENT

Moore's Law has been used to describe a relationship of time and advancement in technology. This same principle can be used to depict a general trend in price versus technological performance over time as circuit manufacturing evolved.

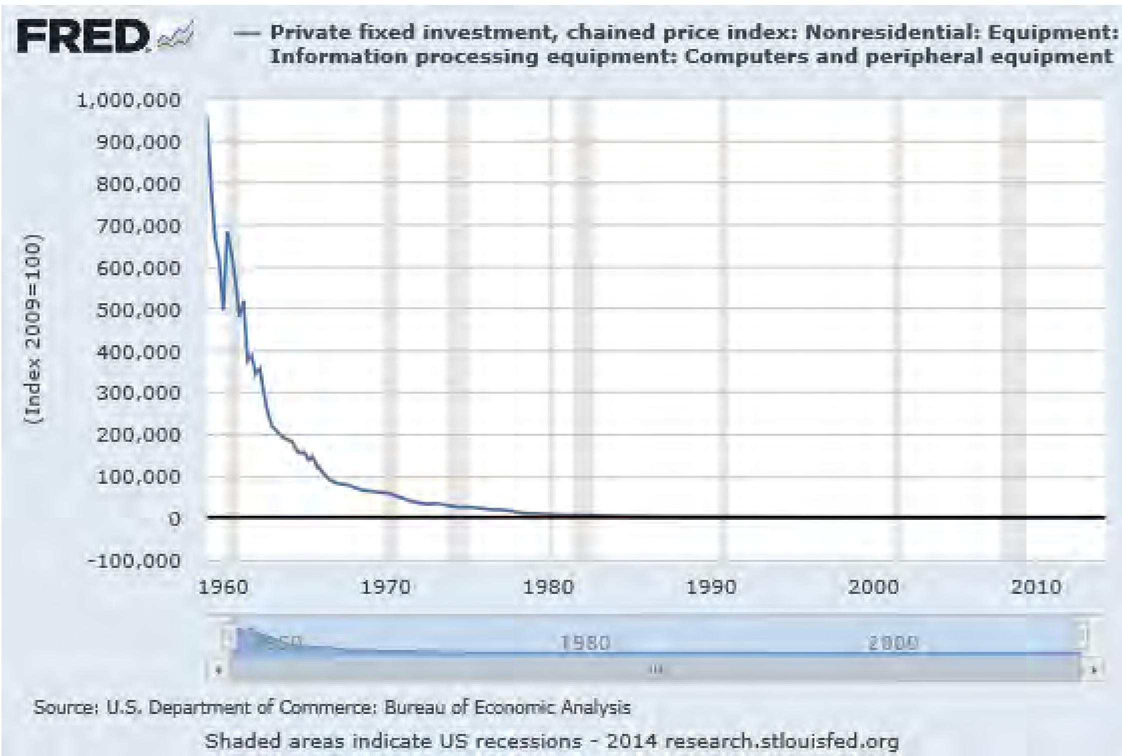

Figure 5. Cost of IT: 1960 to present
(from Economic Research: Federal Reserve Bank of St. Louis, 2014)

Figure 5 shows the investment in IT equipment from 1960 through 2010, roughly the same amount of time Moore's Law has been in existence. The x-axis shows the macroeconomic level of spending represented by a chained price index. This basket-of-goods measure is meant to show how much is spent for certain products being purchased, and then the figure is adjusted for inflation and performance.

The analysis shows a dramatic decrease prices from the early 1960s to the 1980s. The same level of commercial computing power that would have cost almost half a million dollars in 1960 cost less than 100 dollars two decades later.

Figure 6. Cost of IT: 1990–2000
(from Economic Research: Federal Reserve Bank of St. Louis, 2014)

Figure 6 shows an average annual decrease in the chain price index of sixty percent in the 1990s. This statistic translated into prices decreasing by approximately half every nine months versus the typical twenty-four months. Although Moore's Law was initially an observation that was used as a forecasting tool, it became widely accepted and started serving as an unwritten industry standard.

C. CANES CONCEPT OF OPERATIONS

The interplay of business, technical, and operational needs is a balancing act. The CANES program should be analyzed from the perspective of each area to understand what drives the dialogue and eventual decision making. Figure 7 shows the major drivers in the CANES concept of operation. Operational necessity, broadly defined in terms of afloat networks, is the ability to have "anytime, anywhere" communications and available technology (Burbank & Kasch, 2004). Embedded within operational necessity are subelements like manpower, maintenance and scheduling, and training, all of which are necessary for the effective deployment of a system. From the technical standpoint, CANES makes heavy use of COTS hardware and software and is essentially the next iteration of military networks that has slowly gravitated from system-oriented architecture and proprietary technology. Finally, CANES is a product of both industry and military best practices. Acquisition and contracting strategy have also played vital roles in the business-process fielding of the CANES system.

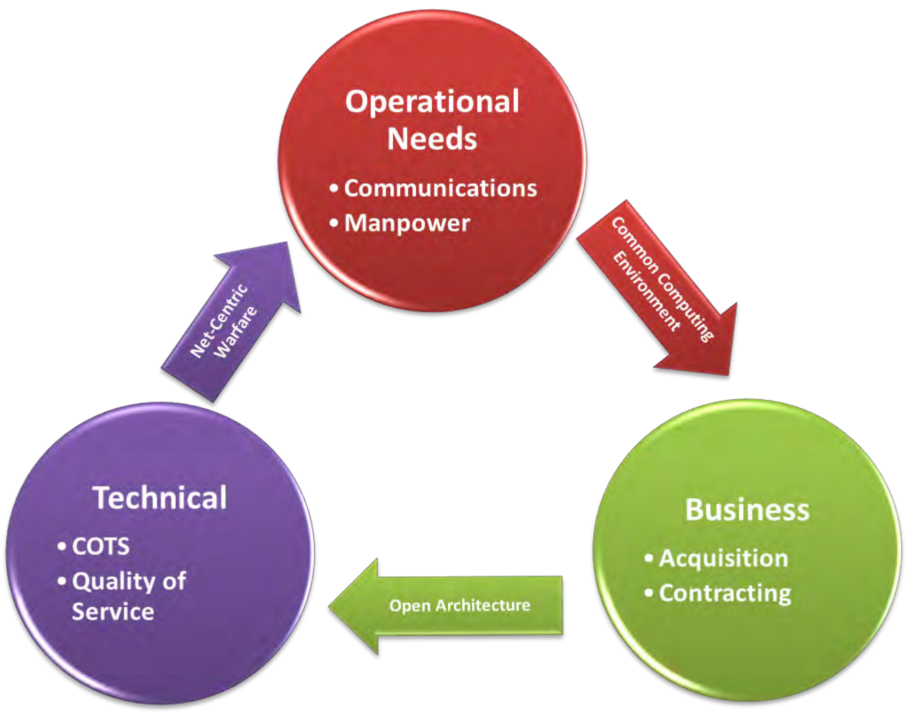

Figure 7. CANES concept of operations
(after Bass & Mabry, 2004; PEO C4I, 2014; Wilson, 2007)

1. Operational Needs

Removing communication as an operational constraint is the ultimate goal of any network program (Burbank & Kasch, 2004). CANES is just one of many communications technologies that works to achieve this aim. The overall strategic-level guidance that determines the concept of operations for system architects is the net-centric warfare (NCW) paradigm (Wilson, 2007). This paradigm is all inclusive of what a network should be, addressing the top-down requirement from strategic to tactical and the joint interoperability concerns across all services (Burbank & Kasch, 2004).

The key to understanding the overall NCW concept and intent of CANES is the approach of the Department of Defense's (DOD's) methodology towards networks. Today's operational frameworks are still based on two regional conventional war scenarios (Cebrowski, & Garstka, 1998). This mindset has dominated national strategy, diplomacy, and, inevitably, procurement. How digital information is used in theatre, therefore, has been shaped by this larger overarching strategy.

Recent history, however, has been marked by nontraditional threats. The global war on terror has shifted the focus away from conventional warfare to more diffused and stateless counterinsurgency (Wilson, 2007). These two paradigms—conventional and nontraditional warfare—tempered by the realities of security, efficiency, scalability, and cost, are the genesis of CANES and all other network-consolidation efforts (PEO C4I, 2014).

Also shaping operational capability is shipboard manpower employment and priority of needs. Aboard ships, the manpower size is determined by the ship's capabilities, mission, and required watches; therefore, certain watch stations and shipboard systems take precedence over routine maintenance and upkeep. Fielding the CANES system was meant to reduce the necessary manpower required to sustain networks. An analysis of the personnel and training requirements is required to understand the ownership cost of the system. Ratings (electronics technician and information systems technician) are assigned to the maintenance of network and information. A number of institutional barriers currently stand in the way of the optimal training and manning model to support CANES. A consolidated and efficiently designed network would require a dedicated skill set for system maintenance and operability but would free up extra personnel to fulfill other jobs and positions aboard ships (Thie, Harrell, McCarthy, & Jenkins, 2009).

2. Technical

Though computer networks have their origins in defense applications, the civilian commercial sector has dominated the field for decades. Successful net-centric operations in future conflicts could be contingent upon closing the technical performance gap between commercial and military network technologies. From the business standpoint, any technology that results in faster integration and improved agility brings an increase in return on investment (Datz, 2004).

Industry consortiums have set standards with little to no input from the DOD sector, resulting in a mismatch of applicable uses for COTS software and devices in DOD environments. Without a dramatic increase in DOD participation in the standards process, the likely long-term network solution will be a mixture of COTS and military components (Burbank & Kasch, 2004).

Network requirements discussions should take into account the concept of quality of service (QOS). QOS is the result of tradeoffs that must occur due to network speed and throughput constraints. QOS consists of three categories: hard real-time, soft real-time, and non-real-time scheduling. Hard real-time is the scheduling required for targeting or air-traffic control. Soft real-time is when momentary network outages or degradation of service quality occur; it is not considered catastrophic, such as voice or video communications would be. Non-real-time would be Web browsing, for example, where degradations in service would not translate into a catastrophe or loss of life. The degree of QOS will dictate how an enterprise's architecture is designed and whether it is federated and net-centric or integrated and system-centric (Bass & Mabry, 2004). Figure 8 shows how the capabilities of the U.S. and adversaries are affected given their level of dependence on COTS technology.

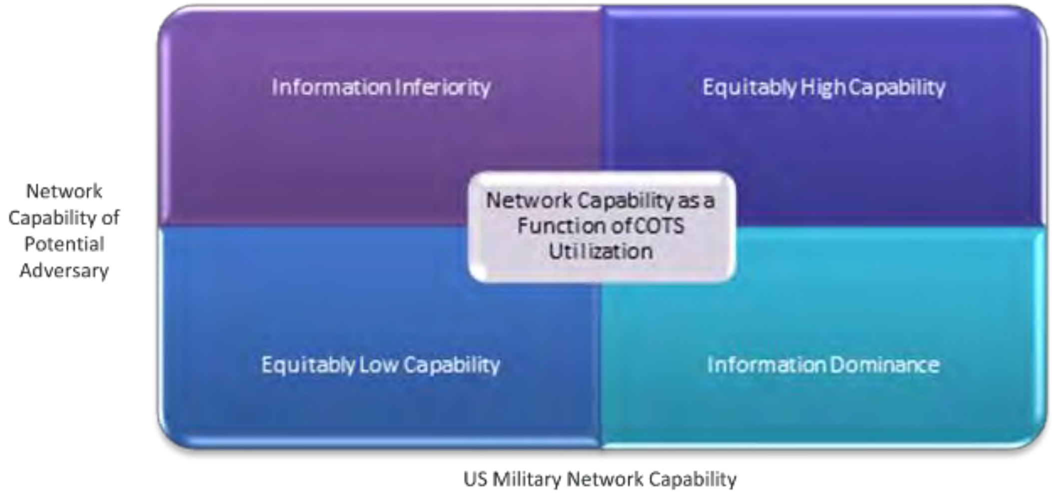

Figure 8. U.S. military network capability (after Burbank & Kasch, 2004)

3. Business

The effects of the 2013 sequestration, government shutdown, and deferred or cancelled ship availabilities all impacted the program schedule (Seligman, 2014). For years the military has fielded communications systems based on proprietary technology, a process which has had long-term cost and performance ramifications. (Burbank & Kasch, 2004). An overly complex IS-type business plan is subject to slow execution; issues that could arise include technology obsolescence, funding instability, immaterial training, and disproportionate manpower distribution (Thie, et al. 2009).

The design refresh goals for CANES software and hardware are two and four years, respectively; for fielding, the goals are four and eight years. The regulatory and operational environment often precludes CANES refresh efforts at a cost to the Navy. The processes associated with vetting and approving an update to CANES can run in excess of several years. When this timeline is placed side by side with Moore's Law–related phenomena, CANES is simply outpaced. Suppliers of the CANES hardware and software maintain a rapid rate of innovation and fielding to stay competitive in the market. Generally, this practice drives prices lower and performance higher. CANES could not take advantage of either the lower prices or the high performance given the slow bureaucratic practices internal to the Navy, the acquisition community, or shipyards.

4. Contracting

The average age of a typical Navy shipboard network is about seven years, which is considerably longer than the average nominal refresh rate of the COTS networks. When ships typically receive new network systems, the hardware and software is already three to four years behind the industry's most current technology. In an attempt to rectify this disparity, the Navy typically amends the installation contracts to allow for upgrades. This procedure normally equates to purchasing the most current hardware and software packages that will meet or exceed the necessary system specifications and are compatible with the existing systems. This process is inefficient and in some cases could cost the Navy double what the cost should have been. The CANES contracting plan was developed through lessons learned and follows a flexible and agile contracting strategy (Riposo, Gordon IV, Murphy, Wilson, & Porche, 2012).

5. Funding

Funding uncertainty is prevalent in many major automated information systems. With the CANES program now in the initial stages of production, near-term funding priorities have shifted to full rate procurement, operations, and maintenance. The assumptions that drive the allocation of procurement and maintenance dollars must be analyzed. No program is completely insulated by the effects of macroeconomic swings or shifting political priorities. The defense-wide trend of reducing operations and maintenance funding could have a profound impact on the overall CANES business strategy.

THIS PAGE INTENTIONALLY LEFT BLANK

III. DEFENSE ACQUISITIONS BUSINESS PRACTICES

Three policy entities govern U.S. military procurement: the Planning, Programming, Budgeting, and Execution (PPBE) Process, the Joint Capabilities Integration Development System (JCIDS), and the Defense Acquisitions System (DAS) (DODI 5000.02). Each serves to deliver capability to the warfighter in the most expeditious and cost effective means possible by achieving the optimal balance between the driving factors of needs, events, and schedule. Figure 9 shows each decision support system and their corresponding guidance documents. Each provides checks and balances between the others' power so as not to field a system that lacks capability, is unsustainable in the long term, or may be cost prohibitive. In the case of CANES and defense computing networks at large, the acquisition policy has served as an institutional barrier that exposes programs to greater risk.

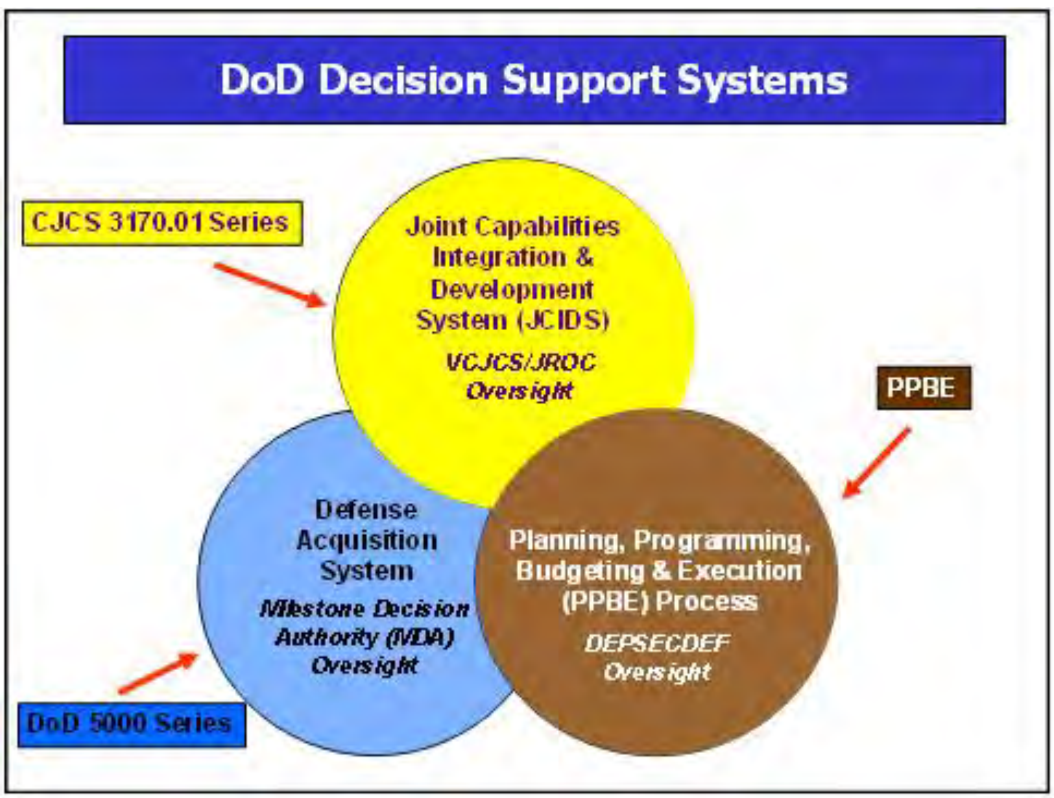

Figure 9. DOD major decision making Process (from Defense Aquisition Guidebook, 2010)

A. DEFENSE ACQUISITION

In the DOD, IS are acquired through the use of the Defense Acquisitions System. DAS manages the nation's investments in technologies, programs, and products necessary to achieve the National Security Strategy and support the U.S. Armed Forces. In a timely manner and at a fair and reasonable price, DAS must acquire quality products that meet or exceed user needs with measurable improvements to mission capability and operations support (Department of Defense, 2003).

Figure 10. Systems engineering quality construct (after Department of Defense, 2008)

Figure 10 represents the quality-of-goods triangle; two of the three items may be had at a cost to the third item. For instance, a quality product or service that performs well and is completed within schedule may be obtained, but the cost will most likely be high.

1. Clinger-Cohen Act (CCA) of 1996

The 1996 CCA was designed to streamline the way the federal government managed IT. Signed as part of the National Defense Act of the 1996 fiscal year (FY), the CCA placed regulatory oversight and assigned responsibility for IT investments to the director of the Office of Management and Budget (OMB) (Defense Aquisition Guidebook, 2010). The CCA also established by law that each federal department appoint a chief information officer (CIO) who would work with the director of OMB as the departmental oversight for interoperability, security, and applicability of IT for their mission areas (Defense Aquisition Guidebook, 2010).

a. Department of Defense Chief Information Officer

The DOD CIO was formally stood up when the Assistant Secretary of Defense for Network Information and Integration (NII) was officially disestablished in 2012 and all responsibilities transferred to the CIO (About DOD CIO, n.d). CIOs are overall responsible for providing standards of IT systems throughout the DOD, including the development, maintenance, implementation, and compliance with the DOD Information Enterprise (Department of Defense, 2009).

b. Director of the Office of Management and Budget

The director of the OMB is responsible for improving federal programs through acquisition, use, and disposal of IT systems by ensuring that all major IT systems are properly fielded for relevance, effectiveness, and applicability (AcqNotes, 2014).

B. JOINT CAPABILITIES INTEGRATION AND DEVELOPMENT SYSTEM

The JCIDS, set in place by Secretary Rumsfeld, provides the capabilities needed to perform globally, eliminate duplication of effort, and allow easier adaptability of new technology across all branches of the military. Under the old requirements schema, all weapons systems were developed solely within their service with little regard to interoperability and the warfighting doctrine of the other services. The end result was either costly redundancy or major capability gaps. A comparison of the old and new requirements process is shown in Figure 11.

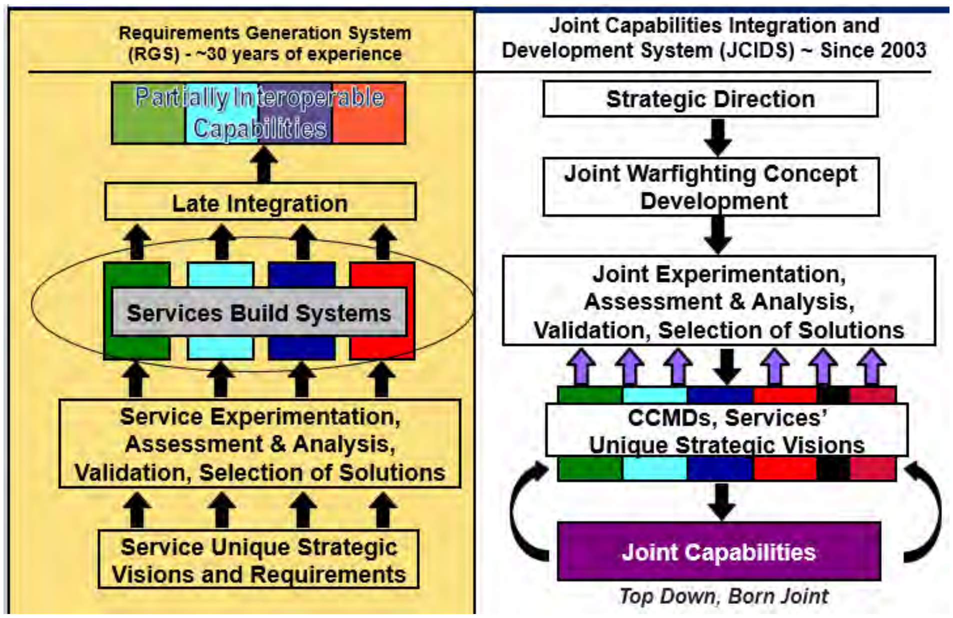

Figure 11. Comparison of old schema and new JCIDS (after Department of Defense, 2008)

The new system espouses a "born joint" philosophy toward requirements development. Service chiefs and combatant commanders are expected to review and revise requirements before acquisition approval to ensure the need is valid and the right system is ultimately built. Future systems are evaluated against their ability to meet missions across the board. The interplay between the stakeholders presumably refines the overall requirement, even if the requirement eventually translates into a service- or platform-specific system such as CANES (Chairman of the Joint Chiefs, 2012).

C. PLANNING, PROGRAMMING, BUDGETING AND EXECUTION (PPBE)

Secretary of Defense Robert McNamara first introduced the Planning, Programming, and Budgeting System (PPBS) during the Vietnam War; this system established a means of resource-driven decision making. In 2001 the DOD changed its business practice and required the use of a combined programming and budgeting phase. The new system was called PPBE; Planning, Programming, Budgeting and Execution; and its methodology serves as a way of streamlining and effectively managing the process of financial resource allocation (Department of Defense, 2013a). The PPBE process is by no means insulated; Congressional pressure and infighting have made the process rough for many programs.

For CANES, budget execution has been met with little pressure. Budget reduction, in the form of committee marks, has amounted to roughly $90 million. The CANES program office engages in periodic "what-if" drills based on major budgetary shifts. According to a Government Accountability Office (2013) report, these practices have substantially reduced program risk.

1. Deficit-Driven Policy

National strategy has been largely affected by public perceptions of the war and recent economic hardship. These realities have been reflected in the procurement decisions of legislators and service chiefs (Department of Defense, 2013b).

a. Budget Control Act (BCA) of 2011

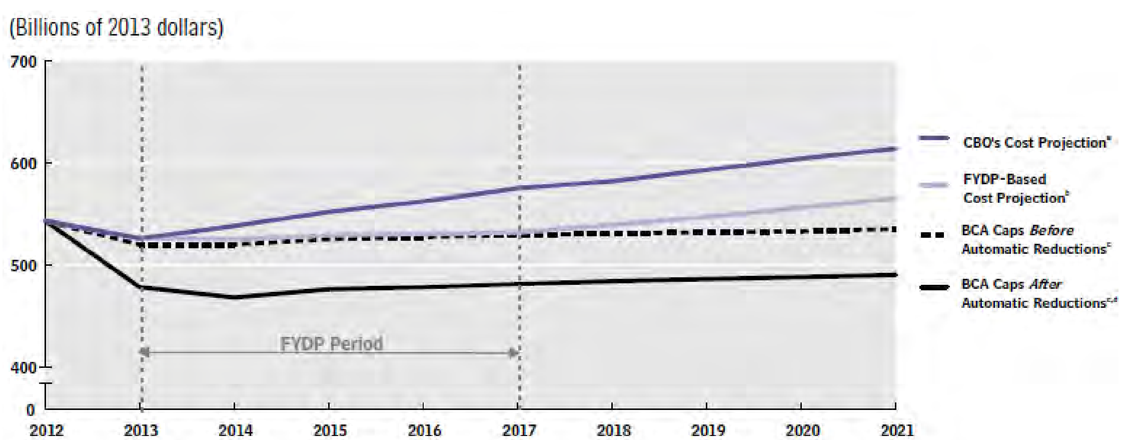

Figure 12. Projected costs of DOD's plans and the BCA caps before and after automatic reductions (from Congressional Budget Office, 2013)

The Budget Control Act (BCA) was written in response to domestic political pressure over the deteriorating state of the economy. Attention shifted from the Global War on Terror when intended effects of the 2007 Iraq troop surge were beginning to materialize (Woodard, 2008). A growing percentage of the American people viewed the War on Terror as a drain on the national treasure. The public outcry against Wall Street mismanagement and cross-sector "bubble bursts" and government bailouts had overtaken the headlines, and legislators were primed to react. Over the years, the DOD has been sensitive to these types of economic realities and has aligned its strategy accordingly. Terms like "fiscal rebalancing" and "spending efficiency" have been used to describe the latest budgetary approach (Assistant Secretary of the Navy, Financial Management & Comptroller, 2014; Department of Defense, 2013b). Figure 13 shows the growing gap between what is budgeted according to the BCA and what is required to fund the Defense Department's planned posture.

The BCA of 2011 requires the Defense Department to reduce spending by $487 billion over ten years. Some estimates predict the sequestration mechanism built into the bill could reduce annual spending by up to another $50 billion (Department of Defense, 2013a; Department of Defense, 2013b).

(Dollars in Millions)	FY2012	FY2013	FY2014
Active Forces			
Ship Maintenance	4,720	5,090	5,192
Depot Operations Support	1,298	1,315	1,351
Baseline Ship Maintenance (O&M,N)	**6,018**	**6,405**	**6,543**
Overseas Contingency Operations	2,181	1,310	0
Total Ship Maintenance (O&M,N)	**8,199**	**7,715**	**6,543**
Percentage of Projection Funded	100%	100%	80%
Annual Deferred Maintenance	0	0	1,311
Ship Maintenance Reset			345
CVN Refueling Overhauls (SCN)	694	1,683	1,951
% of SCN Estimates Funded	100%	100%	100%

Note 1: FY14 deferred maintenance will be addressed via supplemental funding.
Note 2: Totals may not add due to rounding.

Figure 13. Operations and maintenance funding, Navy 2012–2014 (from Department of Defense, 2013b)

Figure 13 shows the overall decrease of operations and maintenance funding. While the topline numbers show an increasing trend, the drastic reduction and eventual disappearance of overseas contingency operations funding bring the total figures down. The request only covers 80% of the operations and maintenance required for that fiscal year.

b. Sequestration

The BCA contains a sequestration mechanism written into its language. Sequestration amounts to the cancellation of funding if a budget is not passed with funding below certain caps. In testimony to the House Armed Service's Subcommittee on Oversight and Investigations, Sean Stackley (assistant secretary of the Navy for Acquisition, Technology and Logistics) warns of the consequences of sequestration.

> If sequestration occurs, automatic percentage cuts are required to be applied without regard to strategy, importance, or priorities, resulting in adverse impact to almost every contract and procurement effort within the Department. Sequestration would adversely impact the Navy's ability to procure the shipbuilding programs programmed in the FY2013 Department of the Navy President's Budget request. Potential reductions to the number of ships procured or stretch-outs to the programs of record will cause cost increases and create shortfalls or delays to ship deliveries, thus impacting the operating forces ability to meet its requirements. (p 1)

The reductions in dollars for modernization translated into a reduction in CANES installations. In 2013, the Navy was able to achieve only eight installations instead of the 15 that were planned for that fiscal year (Serbu, Sequestration Slows Network Modernization That the Navy Can't Wait For, 2013). Without a budget to support a training and deployment cycle as outlined in the Optimized-Fleet Response Plan, maintenance periods in the CANES system are jeopardized.

THIS PAGE INTENTIONALLY LEFT BLANK

IV. ANALYSIS OF APPROACHES

A. OPEN ARCHITECTURE

The acquisition strategy for CANES is open architecture. The methodology of OA is designed to reduce risk and total ownership cost (Guertin & Clements, 2010). Figure 14 shows a comparison of a traditional closed architecture to a new open architecture. Development under the old model was characterized by multiple funding streams and nonexistent technology. The capability gaps, therefore, needed to be filled by technology grown in-house at an additional cost to the program.

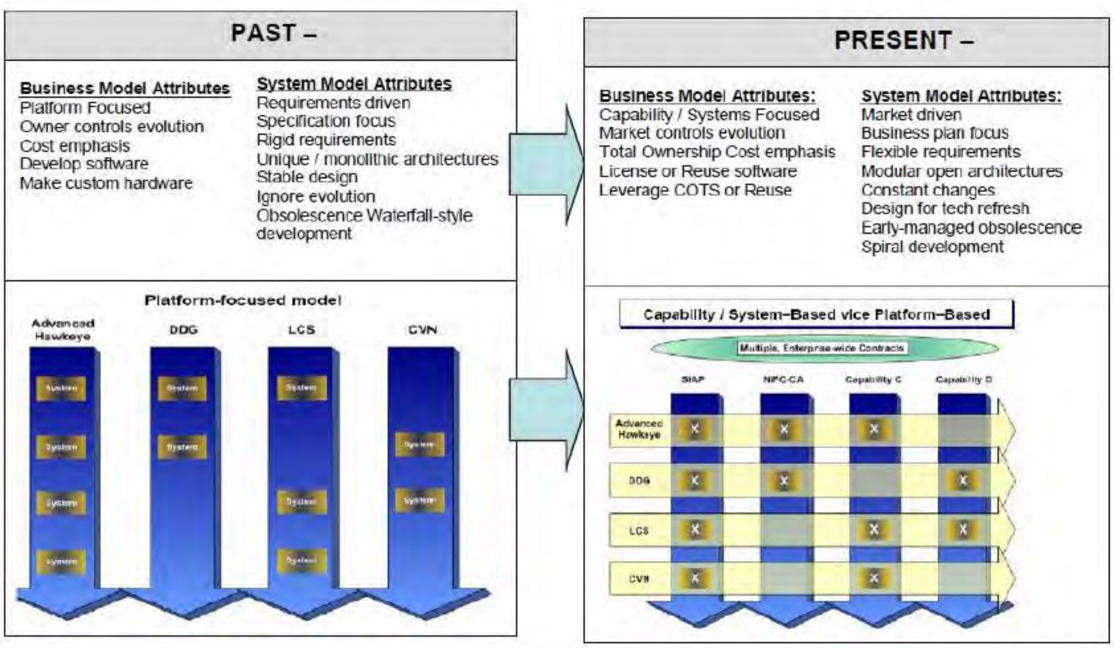

Figure 14. Open architecture concept (from Guertin & Clements, 2010)

An often-referenced case regarding open systems in U.S. Navy acquisition is the successful development of Acoustic Rapid COTS Insertion (ARCI) (Guertin & Clements, 2010). The same premise of decoupling hardware from software was a key component to the ARCI methodology. Moreover, ARCI underscored the feasibility of using COTS technology, this translated into overall expenditure avoidance in the form of software reuse and reduced downtime and maintenance requirements. Most importantly, ARCI's successful fielding using an open systems architecture and COTS technology significantly reduced cycle time (Boudreau, 2006).

CANES leverages existing commercial technology, moving away from military-specific hardware and software requirements to baselines more in sync with the commercial sector (Serbu, Navy Says CANES Network Is 44 Percent Cheaper Than Expected, 2012).

B. NET-CENTRIC WARFARE

While JCIDS provides the process for building requirements, the general philosophy that has governed the fielding of military information technology is grounded in net-centric warfare. The notion of NCW does not imply a purely offensive or defensive posture. The theoretical framework for many of the IT efforts in the DOD have been founded in this set of beliefs first authored in the late 1990s. In some ways, NCW is an extension of many of the technologically driven phenomena experienced in the latter half of the twentieth century. Computer networks have had a profound effect on business and society, so the way of war would naturally follow suit. VADM Arthur Cebrowski classifies NCW as a "revolution in military affairs (Cebrowski & Garstka, 1998)."

The overall operational necessity for a networked battle space is to decrease decision cycle time and allow forces to more precisely align themselves according to the commander's intent (Cebrowski & Garstka, 1998). The theory of NCW is to use technology to facilitate the communication of information to overcome the fog of war (Wilson, 2007).

CANES, tempered by the realities of cybersecurity, the growing necessity for cost avoidance, and the rapid pace of technological advancement, is the next iteration of the afloat Navy's information system. While the requirements process could be time-consuming, building a system that is valid and verifiable in the acquisitions context is crucial. A valid system addresses the question: did we build the right thing? The CANES concept is consistent with the basic tenets of NCW, namely helping to remove digital communication as an operational restraint. In terms of system verification, CANES continuously means to reduce cost by reducing hardware and software redundancy and the associated training and manpower requirements (Thie, et al. 2009).

C. DEFENSE BUDGETING

The financial resources required to successfully sustain programs is constantly under threat. From 2009 to 2014, the overall defense budget has contracted substantially because of the drawdown of hostilities in Iraq and Afghanistan. In that same time span, Congress has passed legislation in response to the domestic fiscal situation. For FY2014, the Defense Department requested \$526 billion. At one point, in 2011, this number bordered \$700 billion (Walker, 2014).

Of the three decision-making entities in defense acquisition, perhaps the most visible is the budgeting—the PPBE—process. Whereas the requirements and program management processes exist in relative insulation, budgeting is subject to more debate and is sensitive to external factors. The CANES program is funded directly by two appropriations: (1) Research, Development, Test and Evaluation (RDT&E) and (2) other procurement. The appendix provides a budget exhibit from the Navy Financial Management and Comptroller Office that shows the amount research and procurement funding requested in the president's budget for FY2014.

1. Recent Budget Trends

Larger trends in the budget have had profound effects on the ability to execute the CANES strategy. The end of hostilities in Iraq and the drawdown of forces in Afghanistan have affected the U.S. defense budget with a general reduction of funding impacting the appropriations to different degrees. The effect is amplified because weapons and systems are much more complex than they were in the past. There is an inextricable link between a system and the manpower, training, and logistical support must be in place to support the system. A change in one funding stream, therefore, could have unforeseen consequences. Figure 15 shows the percentage breakdown of each major appropriation for FY2014.

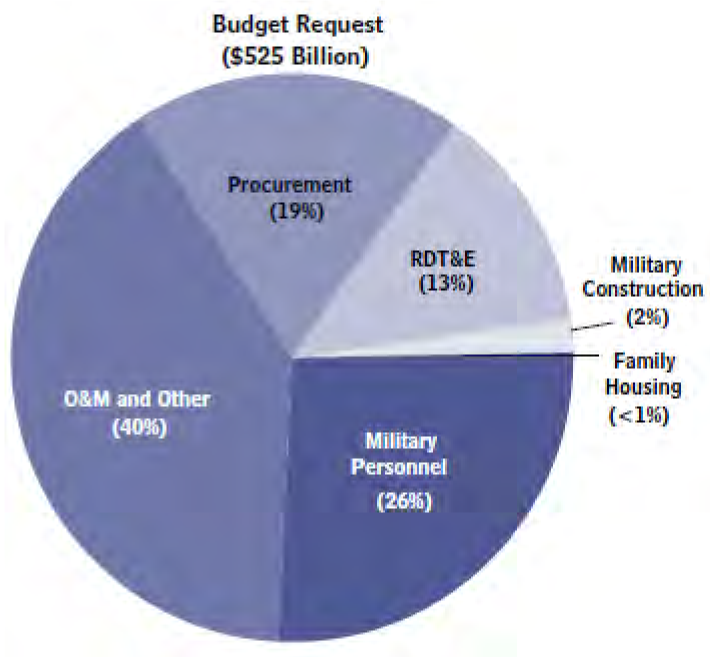

Figure 15. Defense appropriations by percentage of total budget FY2014 (after Congressional Budget Office, 2013)

2. Military Personnel

The military personal appropriation goes to pay service members and cover related expenses, such as housing, subsistence, and costs related to transferring duty stations (Under Secretary of Defense, Acquisition, Technology & Logistics, 2013). The appropriation has grown the most from 2001 through 2014; nearly 46% since 2000. This growth is due mostly to Operational Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) troop mobilization (Congressional Budget Office, n.d.).

3. Operation and Maintenance

To support deployed troops, the operation and maintenance appropriation also grew. Operations and maintenance funding, also referred to as O&M, provides for the day-to-day costs associated with training and deployment of personnel and for costs associated with maintaining equipment (Under Secretary of Defense, Acquisition, Technology & Logistics, 2013). O&M funding goes to paying contractors and civilian employees in contrast to uniformed personnel who are paid through the personnel appropriation.

4. Research, Development, Test and Evaluation

Also known as RDT&E, this appropriation fund covers the expense related to developing and refining future technology (Under Secretary of Defense, Acquisition, Technology & Logistics, 2013).

This appropriation is constantly under threat of being cut by policymakers. Sometimes considered as "low-hanging fruit," RDT&E budgets often come under scrutiny. Efforts to cut research funding are not met with as much opposition as proposed cuts to personnel or operations and maintenance; consequently, the RDT&E accounts are targeted when an immediate reduction is required. The CANES program is in the early stages of full rate initial production, with full-up-round systems now operational on the USS MCCAMPBELL and the USS MILIUS. A system in this stage will experience a shift in the proportion of its budget away from RDT&E to procurement.

5. Procurement

Whereas the personnel and O&M appropriations are considered expense accounts, procurement is viewed as an investment. With the exception of ship construction, which lasts five years, all procurement funding lasts a total of three years. This characteristic provides more flexibility and stability in execution over that of expense-type funding that must be renewed annually (Under Secretary of Defense, Acquisition, Technology & Logistics, 2013).

THIS PAGE INTENTIONALLY LEFT BLANK

V. CONCLUSION

In the CANES environment, the program office executes the overall acquisition strategy. Whereas the financial resources and technical requirements come from the PPBE and JCIDS, respectively, the acquisitions process translates those requirements and resources into operational capability. The CANES program office is the primary interface between resource and requirements entities and partners in industry who physically design and build the system. Installation, maintenance, and life-cycle support for CANES is managed through the program office (Under Secretary of Defense, Acquisition, Technology & Logistics, 2013).

This project provides an analysis of the current acquisition approaches shaping the CANES program. The defense acquisition community has tried many tailored methodologies when fielding an information system such as CANES. Defense information technology has been outpaced by the commercial sector due to a time-intensive and unwieldy acquisition process.

The CANES system is a product of the competing demands implicit in the acquisition process. Separation of function within the process ensures a balance between cost, performance, and schedule. The relationship of these elements can be detailed in the decision-making structure that supports the CANES acquisition; JCIDS, PPBE and the defense acquisition community (Under Secretary of Defense, Acquisition, Technology & Logistics, 2013).

Concrete---→Abstract			
Decision Making	Approach	Primary Drivers	Secondary Drivers
Planning, Programming, Budget & Execution (PPBE)	Deficit Driven	Cost	1. Budget Control Act 2. Optimized – Fleet Response Plan
Joint Capabilities Integration and Development System (JCIDS)	Net Centric Warfare/Operations	Performance	1. Clinger-Cohen Act (CCA) 2. Service and platform interoperability
Defense Acquisition	Open Architecture	Schedule	1. Technological Growth Concept 2. Common Computing Environment 3. Commercial-of the-shelf (COTS)

Table 1. Approaches and drivers in acquisition decision making (after Chairman of the Joint Chiefs, 2012; Congressional Budget Office, n.d; Guertin & Clements, 2010; Under Secretary of Defense, Acquisition, Technology & Logistics, 2013; Wilson, 2007)

A. REQUIREMENTS

Delivering capability to the warfighter first begins with defining requirements. The traditional bottom-up approach of formulating requirements yielded systems that are service specific and tied to proprietary technology. Life-cycle support, therefore, became costly and complex. With the inception of the JCIDS process, programs were “born joint.” Interoperability with other services and integration with existing systems became the key parameters by which performance was assessed (Chairman of the Joint Chiefs, 2012; Under Secretary of Defense, Acquisition, Technology & Logistics, 2013).

CANES is consistent with the strategic visions put forth in NCW and CCA. With respect to NCW, CANES helps to remove communications as an operation limitation. The consolidation aspect of CANES makes networks easier to manage and less costly to maintain, which makes it consistent with the language of the CCA (Wilson, 2007).

B. PROGRAM MANAGEMENT

The responsibility of the Program Office is to manage the technical design, logistical support, testing and fielding of the system. Driving many of the activities of the program office is schedules. While the Program Office is also responsible for the efficient use of financial assets in the form of its own budget, its main goal is to deliver the capability on time. Statutory requirements and a series of reviews ensure that a system is valid and verifiable in the acquisition context.

IT scholars and practitioners have long observed the rapid growth of technology; applying these growth concepts to a variety of fields and sectors. Research and development timelines, cost projections, and marketing strategies have all been, to some degree, aligned to the two-year time-performance construct posited by Gordon Moore in the mid-1960s. The effect of this rapid growth was met by the acquisition community with eagerness (Department of Defense, 2013b). Best practices from industry were quickly incorporated into the DOD and Navy's IT acquisition strategy. Beginning with programs like ARCI, the Navy has leveraged COTS hardware and software when feasible (Boudreau, 2006). The CANES acquisition strategy continues this COTS effort, expanding its application to a common computing environment known commercially as "Cloud Computing."

C. BUDGETING

The wars in Afghanistan and Iraq have driven defense budgeting from 2001 through 2014. A global economic downturn in the late 2000s, however, moved the focus to domestic fiscal issues. The watershed moment came in 2011, as the federal government was in danger of surpassing the debt ceiling and experienced an unprecedented downgrade of its credit rating by Standard & Poor's. Congress passed the BCA that same year, which called for reducing the Defense Department's budget by $487 billion from 2013 to 2021. Automatic reductions, in the form of sequestration, were also written into the language; this sequestration would be triggered if Congress could not reach the deficit reduction goal set forth in the act (Department of Defense, 2013).

The PPBE process is bureaucratically complex so scarce financial resources are distributed in the most effective manner possible. Whereas the requirements and acquisition processes have been quick to adapt to the rapid pace of technological development, budgeting has remained unchanged since the Vietnam War (Department of Defense, 2013). The time-consuming process of obtaining funding has worked to the detriment of afloat IT capability. Ultimately, the greatest challenge for CANES is the installation of the system. The postwar reduction of funding, specifically in O&M, has caused a scheduling bottleneck which has no immediate solution.

D. FURTHER RESEARCH

1. Business Process Reengineering

The budgeting process is complex, requiring many approvals and compliance reviews. Responsibility for a coherent and executable budget not only runs across multiple services but also several federal government agencies, such as the OMB. An "as-is" model could provide insight into redundant administrative processes. Redesigning the process using IT knowledge value added in a "to-be" model could reduce the time required to produce a budget. A more agile budget process could, in turn, help to align the Navy's IT acquisition timeline closer to that of its industry partners (GAO, 1997)

2. Opportunity Cost of Current Acquisition Strategy

Moore's Law and its various repurposed claims have driven the strategies of the commercial sector for decades. Many Navy IT systems, however, continue to be composed of a patchwork of unsupported legacy software and proprietary technology because of the inefficiencies in the acquisition process. Competition and innovation generally drive up performance and drive down prices (Chairman of the Joint Chiefs, 2012). The opportunity costs that occur as this gap widens could be analyzed in the context of time or money.

3. Long-Term Effects of Deficit-Driven Budgeting on Future Information Systems

The second- and third-order effects of a postwar deficit-driven budget strategy are yet to be seen. The 2014 Quadrennial Defense Review dedicates an entire chapter to the possible ramifications of budget reductions and sequestration, bluntly stating, “Cuts to meet these budget levels would slash force structure and modernization too deeply to viably execute our defense strategy” (Department of Defense, 2014). Information technology consolidation efforts like CANES and the Joint Information Environment could be face further delays.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A. OTHER PROCUREMENT DON FY 2014 PRESIDENT'S BUDGET TOTAL OBLIGATIONAL AUTHORITY

UNCLASSIFIED

Department of the Navy
FY 2014 President's Budget
Exhibit P-1 FY 2014 President's Budget
Total Obligational Authority
(Dollars in Thousands)

28 Feb 2013

Appropriation	FY 2012 (Base & OCO)	FY 2013 Base Request with CR Adj*	FY 2013 OCO Request with CR Adj*	Emergency Disaster Relief Act of 2013	FY 2013 Total Request with CR Adj*
Other Procurement, Navy	6,260,555	5,990,224	98,882		6,089,106
Total Department of the Navy	6,260,555	5,990,224	98,882		6,089,106

P-1C: FY 2014 President's Budget (Published Version), as of February 28, 2013 at 15:34:17
* Reflects the FY 2013 President's Budget with an undistributed adjustment to match the Annualized Continuing Resolution funding level by appropriation.

UNCLASSIFIED

Volume 1 - vii

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B. RDT&E DON FY 2014 PRESIDENT'S BUDGET TOTAL OBLIGATIONAL AUTHORITY

UNCLASSIFIED

Department of Defense
FY 2014 President's Budget
Exhibit R-1 FY 2014 President's Budget
Total Obligational Authority
(Dollars in Thousands)

27 Feb 2013

Appropriation	FY 2012 (Base & OCO)	FY 2013 Base Request with CR Adj*	FY 2013 OCO Request with CR Adj*	Emergency Disaster Relief Act of 2013	FY 2013 Total Request with CR Adj*	FY 2014 Base
Research, Development, Test & Eval, Navy	17,723,271	17,848,141	60,115		17,908,260	15,974,780
Total Research, Development, Test & Evaluation	17,723,271	17,848,141	60,115		17,908,260	15,974,780

R-1C: FY 2014 President's Budget (Published Version), as of February 27, 2013 at 13:26:53
* Reflects the FY 2013 President's Budget with an undistributed adjustment to match the Annualized Continuing Resolution funding level by appropriation.

UNCLASSIFIED

Volume 1 - v

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

About the Department of Defense Chief Information Officer (DoD CIO). (n.d.). Retrieved 23 November 2014 from http://dodcio.defense.gov/AboutCIO.aspx

AcqNotes. (n.d). *Information Technology: Clinger-Cohen Act*. Retrieved from AcqNotes - A Simple Source fo DOD Acquistion Knowledge for the Arespace Industry. Retrieved 22 November 2014 from http://acqnotes.com/acqnote/careerfields/clinger-cohen-actinformation-technology

Assistant Secretary of the Navy, Financial Management & Comptroller. (2013). *Highlights of the Department of the Navy FY 2014 budget.* Retrieved from http://www.finance.hq.navy.mil/FMB/14pres/Highlights_book.pdf.

Bass, T., & Mabry, R. (2004). Enterprise architecture reference models: A shared vision for service-oriented architectures. *IEE MILCOM*. Retrieved from www.dtic.mil/dtic/tr/fulltext/u2/a484389.pdf.

Boudreau, M. (2006). Acoustic Rapid COTS insertion: A case study in spiral development. Retrieved from http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4304229.

Burbank, J., & Kasch, W. (2004). COTS communication technologies for DOD applications: Challenges and limitations. IEEE Military Communications Conference (pp. 1172–1178). Laurel: IEEE. Retrieved from http://ieeexplore.ieee.org.libproxy.nps.edu/stamp/stamp.jsp?tp=&arnumber=1495111.

Cebrowski, A., & Garstka, J. (1998). Net-centric warfare: Its origins and future. *Proceedings*. Retrieved from http://www.usni.org/magazines/proceedings/1998-01/network-centric-warfare-its-origin-and-future.

Chairman of the Joint Chiefs. (2012). Joint Capabilities Integration and Development System. *Chairman of the Joint Chief Instruction 3170.01H*. Retrieved from https://acc.dau.mil/jcids.

Congressional Budget Office . (2013). *Approaches for scaling back the Defense Department's Budget Plans.* Washington, DC: Congressional Budget Office. Retrieved from https://www.cbo.gov/publication/43997.

Congressional Budget Office. (n.d.). *Growth in DOD's budget from 2000 to 2014.* Washington, DC: Congressional Budget Office. Retrieved from http://www.cbo.gov/publication/49764.

Datz, T. (2004). What you need to know about service-oriented architecture. Retrieved from CIO September 6, 2014, CIO.www.cio.com.

Defense Aquisition Guidebook. (2010). Defense Acquisition University. Retrieved from https://dag.dau.mil/Pages/Default.aspx.

Department of Defense. (2003). Department of Defense Directive 5000.01. *The Defense Acquisiton System*. Retireved from http://www.dtic.mil/whs/directives/corres/pdf/500001p.pdf.

Department of Defense. (2008). Department of Defense Directive 5000.02. *Operation of the Defense Acquisition System*. Retireved from http://guidebook.dcma.mil/56/DoD_5000_02.pdf.

Department of Defense. (2009). Department of Defense Directive 8000.01. *Management of DOD Information Resources and Technology*. Retrieved from http://www.dtic.mil/whs/directives/corres/pdf/800001p.pdf

Department of Defense. (2013). Department of Defense Directive 7045.14. *The Planning, Programming, Budgeting, and Execution (PPBE) Process*. Retrieved from http://www.dtic.mil/whs/directives/corres/pdf/704514p.pdf.

Department of Defense. (2013). *Defense budget priorities and choices: Fiscal year 2014.* Department of Defense. Retireved from http://www.defense.gov/pubs/DefenseBudgetPrioritiesChoicesFiscalYear2014.pdf.

Department of Defense. (2014). *Quadrennial defense review 2014.* Washington, DC: DOD. Retrieved from http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf.

Economic Research: Federal Reserve Bank of St. Louis. (2014). Retrieved from http://research.stlouisfed.org/fred2/series/B935RG3Q086SBEA.

Government Accountability Office. (1997). *Business process re-engineering assessment guide.* Retrieved November 2014. Retrieved from http://www.gao.gov/special.pubs/bprag/bprag.pdf.

Government Accountability Office. (2013). *Major automated information systems: Selected defense programs need to implement key acquisition practices.* (GAO-13-311). Washington, DC: U.S. Government Acccountability Office. Retrieved from http://www.gao.gov/products/GAO-13-311.

Guertin, N., & Clements, P. (2010). Comparing acquisition strategies: Open architecture vs. product lines. *Proceedings*. Retrieved from https://acc.dau.mil/adl/en-US/363116/file/50125/Comparing%20Acquisition%20Strategies%2011Apr2010.pdf.

House Armed Services Committee. (2012). Mechanics of sequestration and its effects on military operations. Retrieved from http://www.gpo.gov/fdsys/pkg/CHRG-112hhrg76213/html/CHRG-112hhrg76213.htm.

McMillan, R. (2014, June). Is the end of Moore's Law slowing the world's supercomputing race? *Wired*. Retrieved from http://www.wired.com/2014/06/supercomputer_race/.

Moore, G. (1965). Cramming more components onto integrated circuits. *Electronics, 38*. Retrieved from web.eng.fiy.edu

Program Executive Office, Command, Control, Communications, Computers and Intelligence (PEO C4I). (2014). *Tactical Networks Introduction (PMW 160).*.

Riposo, J., Gordon IV, J., Murphy, R., Wilson, B., & Porche, I. R. (2012). CANES Contracting Strategies for Full Deployment. Santa Monica, CA: RAND National Defense Research Institute. Retrieved August 2014 from http://www.rand.org/pubs/technical_reports/TR993.html.

Schaller, R. (2002). Moore's law: past, present and future. *IEEE Spectrum*, 52–59. Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=591665&tag=.

Seligman, L. (2014). Navy ups number of CANES installation, despite repeated delays. *Inside the Pentagon's Inside the Navy*, *27*(6). Retrieved from http://search.proquest.com.libproxy.nps.edu/docview/1496650593/fulltext/6387138DCAEF4B78PQ/1?accountid=12702.

Serbu, J. (2012). Navy says CANES network is 44 percent cheaper than expected. *Federal News Radio*. Retrieved from http://www.federalnewsradio.com/412/2855378/Navy-says-CANES-network-is-44-percent-cheaper-than-expected.

Serbu, J. (2013). Sequestration slows network modernization that the Navy can't wait for. *Federal News Radio*. Retrieved from http://www.federalnewsradio.com/412/3344908/Sequestration-slows-network-modernization-that-Navy-cant-wait-for.

Thie, H., Harrell, M. C., McCarthy, A. S., & Jenkins, J. (2009). *Consolidated Afloat Network and Enterprise (CANES) manpower, personnel and training implications.* Santa Monica,CA: RAND National Defense Research Institute. Retrieved August 2014 from http://www.rand.org/pubs/monographs/MG896.html.

Tuomi, I. (2002, November 4). The lives and death of Moore's Law. *First Monday*. Retrieved from http://firstmonday.org/ojs/index.php/fm/article/view/1000/921.

Under Secretary of Defense, Acquisition, Technology & Logistics. (2013). Operation of the Defense Acquisition System: DOD Instruction 5000.02. Retrieved from www.acq.osd.mil/docs/DSD%205000.02_Memo+Doc.pdf.

Walker, D. (2014, July 15). *Trends in U.S. military spending*. Retrieved from Council on Foreign Relations http://www.cfr.org/defense-budget/trends-us-military-spending/p28855

Wilson, C. (2007). *Network centric operations: Background and oversight issues for Congress.* (CRS Report No. /RL32411). Washington, DC: Congressional Research Service. Retrieved from https://www.fas.org/sgp/crs/natsec/RL32411.pdf.

Woodard, B. (2008). Why did violence plummet? It wasn't just the surge. *Washington Post*. Retrieved from http://www.washingtonpost.com/wp-dyn/content/article/2008/09/07/AR2008090701847.html.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
   Ft. Belvoir, Virginia

2. Dudley Knox Library
   Naval Postgraduate School
   Monterey, California